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National Weather Service Forecast Office
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John Cole
& James
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Inside This Edition of the Storm Courier...

During this time of the year, reports from spotters are still very much appreciated. Even though we are well into the fall season, convective storms still can occur during the fall months, and even the winter months. The National Weather Service (NWS) needs your reports any time of day or night, any time of the year. The effort that most of you, as our good neighbors, put into the SKYWARN Program to help your "neighbor" is commendable. Your reports have been timely and assisted us tremendously in issuing and verifying warnings.

I'm sure that when you first became a part of our network, you were excited to become an ally of the NWS. We would like to work with each of you to keep that interest as high as possible. Sometimes our interests begin to wane after a couple of years for whatever reason. The Charleston office wants to rekindle the early flame that you exhibited by conducting follow-up spotter training classes. The classes will be for anyone who has not gone through the training at least twice and received their training before January 1, 1999.

Those of you who have taken the class twice already may want to schedule an advanced class. It is our hope that we can schedule all refresher and/or advanced classes prior to the 2001 Georgia/South Carolina severe weather season (March-May). So do not delay. Begin making plans in your group to decide the most convenient time to schedule a class for maximum attendance. You may contact John Cole or me at 800-897-0823, or locally at 554-0197. Your cooperation in this matter will be greatly appreciated.

A reminder... Please let us know if your address or phone number has changed, so that we can keep our spotters list current. If you know of another spotter who has moved and is still in the Charleston County Warning Area (CWA), please ask that person to send us their new address and telephone number, if they want to remain a trained spotter.

Again, thanks for all that each of you do to help us to be the best National Weather Service office that we can be!

Sincerely,

Jerry Harrison
Warning Coordination Meteorologist (WCM)

Summary of the 2000 Hurricane Season...

By John Cole, Senior Forecaster

Another active hurricane season will go into the record books for the first year of the new millennium. Fourteen storms have formed with 8 reaching hurricane intensity (74 mph winds or higher), and of those, 3 were categorized as major hurricanes (winds greater than 110 mph).

June and July were inactive months, which is typical, with only 2 tropical depressions observed in June. August was above average with 2 hurricanes and 2 tropical storms. Alberto became the first major hurricane of the season with peak winds of 125 mph. September was well above average with 7 named systems. Five reached hurricane intensity, and of those, Isaac and Keith, developed into category 4 major hurricanes. During the month of October, there were 3 named storms (1 hurricane and 2 tropical storms), which is above average for the month of October. The average for October is 1 hurricane and 1 tropical storm.

Gordon was the first landfalling system of the year, coming onshore as a strong tropical storm near Cedar Key, FL on September 17. Tropical storm watches and eventual warnings were issued for the southeast Georgia coast, and the south coast of South Carolina. The main impact across the CWA was heavy rainfall, which is the focal point of the article entitled "Water...Water...in Some Places." Flash flood warnings were issued by the Charleston National Weather Service office with significant flooding occurring across McClellanville, prompting the closure of U.S. Highway 17 due to standing water.

Helene made landfall near Fort Walton Beach, FL on the 22nd as a weak tropical storm. The remnants of Helene moved across the county warning area producing both flooding and isolated tornadoes. The entire area remained under a flash flood watch throughout the day and into the evening. Again, please see my colleagues' article for more specifics in regard to the severe flooding.

As is the case with most landfalling tropical systems, Helene produced tornadoes in the preferred right front quadrant. Three tornadoes were spawned across the area during the late evening hours of the 22nd through the early morning hours of the 23rd. The first tornado developed at 10:55 p.m. near the town of Perkins in Jenkins County, GA. The F0 tornado (on the Fujita scale) damaged some trees and was on the ground for 1 mile with a path width of 175 yards. The second tornado, an F1, was 350 yards wide and developed at 11:50 p.m., 1 mile northwest of Martin in Allendale County, SC. This tornado was also on the ground for 1 mile, causing some structural damage and injuring one person. Shortly thereafter, at 12:30 a.m. on the 23rd, an F2 killer tornado, 880 yards wide, developed 2 miles northwest of Martin, and was on the ground for 5 miles. A 68-year-old man was killed when his RV disintegrated. In addition, five others received minor injuries. Six mobile homes and one building were damaged. Once again we see that it doesn't take a direct impact from a major hurricane to have significant damage or even deaths across the area. Secondary effects from landfalling tropical systems can be very costly indeed.

During October, only 1 of the 3 systems was near the southeast U.S. coast, tropical storm Leslie. Leslie was a short-lived storm that developed off the east coast of Florida, and moved northeastward over the western Altantic. During the middle of the month, Hurricane Michael formed out of a non-tropical low pressure system that had been nearly stationary northeast of the Bahamas. The system eventually made landfall along the southern coast of Newfoundland.

To summarize, the 2000 Atlantic hurricane season has been above average with 14 named storms thus far. On average, we see 10 named storms in any one year. Six of those reach hurricane intensity, and of those, 2 develop into major hurricanes.

Dr. William Gray and his research team at Colorado State University have done a good job with their forecast this year. They expected 11 total storms, 7 hurricanes, and 3 major hurricanes.

Dr. Gray will give us his initial prediction for the upcoming 2001 hurricane season late in November, or early December of this year. By then, researchers will have a better idea if El Nino conditions will develop across the Eastern Pacific in 2001. Strong to moderate El Nino episodes have the effect of limiting hurricane activity across the Atlantic basin due to shearing winds. Stay tuned for the rest of the story.

Climatology of the Past Summer in the Lowcountry...

By James Brotherton, Meteorologist Intern

The most significant weather pattern to occur during the past summer was the propagation of surface fronts into the area. During a typical summer in the lowcountry, rainfall is generated primarily from daytime heating, convective rainfall events (like "popcorn" storms), and the interaction of the sea breeze with less marine-like airmasses (plus late-summer tropical moisture). It is unusual for large-scale surface fronts to make their way far enough to the south to penetrate the lowcountry in the summer. However, early season widespread drought conditions were partially mitigated in many areas by several advancing fronts that generated multiple rainfall events throughout the lowcountry.

month	monthly tot	dept.	yearly dept.
JUN	4.35	-2.08	-7.79
JUL	10.81	3.97	-3.82
AUG	4.47	-2.75	-6.57
SEP	8.88	4.15	-2.42

Precipitation at the Charleston Airport (in):

month	avg hi	avg lo	avg daily	avg dept.
JUN	89.9	69.5	79.7	1.4
JUL	90.5	72.5	81.5	0
AUG	88.4	72.2	81.5	-0.3
SEP	83.1	67.3	75.2	-1.2

Temperatures at the Charleston Airport (deg F):

month	monthly tot.	dept.	yearly dept.
JUN	5.47	-0.19	-5.52

JUL	3.57	-2.81	-8.33
AUG	4.18	-3.28	-11.61
SEP	7.45	2.98	-8.63

Precipitation at the Savannah Airport (in):

month	avg hi	avg lo	avg daily	avg dept.
JUN	90.2	68.2	79.2	0.1
JUL	93.4	70.6	82.0	0.2
AUG	91.3	70.6	81.0	0.0
SEP	83.4	67.6	75.5	-1.1

Temperatures at the Savannah Airport (deg F):

Climatological Outlook (Long-Term)...

The past El Niño / Southern Oscillation (ENSO) event was a La Niña episode, and has continued to weaken. We are currently in a state of neutrality in terms of the equatorial Pacific Ocean sea surface temperatures (SST's). Forecasts indicate that tropical Pacific Ocean temperatures will continue to be close to normal; hence neither La Niña or El Niño will be a significant factor in the long-term forecast.

Another impact for the U.S. in terms of long-term climate forecasts, is the Pacific Decadal Oscillation (PDO). The climatological impacts of PDO are very similar to that of ENSO. However, scientists are still trying to understand if the PDO is either; 1) A distinct phenomenon resulting from the ocean-atmosphere interaction in the tropics; 2) Just another way of looking at the decade-to-decade variation in the numbers of El Niños or La Niñas; or 3) A result of the ocean-atmosphere interaction in the midlatitudes of the Pacific. Ultimately, no capability currently exists to forecast the PDO.

Based on the above thoughts, the NWS's Climate Prediction Center (CPC) has put together a few scenarios as to what should transpire in an ENSO neutral season. Of significance to the lowcountry is the expectation of more days with minimum daily temperatures below freezing compared to the past *three* winters. Even so, temperatures are forecast to run warmer than the normal period (1961-1990) this winter. This just shows how warm the last three winters have been in the lowcountry! Precipitation is forecast to be near normal through the winter in the southeast United States.

For more information, technical discussions and graphics concerning the climate, check out the CPC's webpage at: http://www.cpc.noaa.gov

Water...Water...in Some Places!

By Eleanor Vallier-Talbot, Senior Forecaster

Since mid July, copious amounts of rain have fallen across Berkeley, northern Dorchester and central and eastern Charleston Counties. In mid to late July, a front became stationary across the Lowcountry. Showers and thunderstorms moved along the front, repeatedly falling across the same areas; meteorologically this is known as training. The lion's share of rain fell across northern Berkeley County in this event. The towns of St. Stephen, Pineville, and Bonneau received an estimated 10 to 12 inches of rain. Heavy

rain also fell across sections of central and eastern Charleston County, mainly across the Francis Marion National Forest and along U. S. Highway 17 from Awendaw to McClellanville. July's precipitation total for Charleston International Airport was 10.81 inches, almost 4 inches above normal. However, near Lake Moultrie in northern Berkeley County, some locations had estimated monthly totals from 15 to 17 inches. Further south, across the Savannah River Valley and Coastal Empire of southeast Georgia, the rain was not nearly as heavy. Savannah's monthly total was only 3.57 inches, more than 2.75 inches below normal. Even along coastal areas, rainfall has been scarce. The station at the Customs House in downtown Charleston only reported a yearly total of 15 inches through the end of July.

The rainfall waned a bit in August, normally the month with the highest average rainfall. Several rounds of thunderstorms moved across the region, in association with a series of fronts that either stalled over the area or moved just south. The rain was scattered about, with some areas getting pounded with heavy rainfall, while many others remained dry. Again, heavier rainfall occurred across Berkeley and eastern Charleston Counties, with a series of fronts that tended to stall in that area. Rainfall totals for Charleston Airport ran 2.75 inches below normal, while Savannah had a deficit of 3.28 inches for August.

September rolled in, and so did the remnants of two tropical systems that moved across southern Georgia and South Carolina. First, low pressure formed off the South Carolina coast during late August, and meandered across the region through the Labor Day weekend. More copious rain fell across the Lowcountry, especially over inland areas of Charleston and Berkeley Counties. A flood warning was issued during the early morning hours of September 5 for those counties. The low finally weakened as a cold front pushed across the area by late in the day.

Heavy rains returned to the same areas, this time from the remnants of Hurricane Gordon. Most areas from Colleton County south to the Altamaha River only received about one half to 2 inches of rain from Gordon. However, the rain jackpot for this storm, ***once again***, occurred across Berkeley and eastern Charleston Counties. Radar estimated rainfall amounts were between 10 and 12 inches. McClellanville reported flooding throughout the town, along with the closure of a portion of Highway 17 due to standing water. In Georgetown, a large section of Highway 17 was closed most of the 18th due to the flooding caused by Gordon. Flood warnings were issued for eastern Charleston, Georgetown and Horry Counties during the morning.

A second tropical visitor moved north of the region in the form of former Tropical Storm Helene, which tracked across central Georgia and the midlands of South Carolina during the overnight hours of the 22nd - 23rd. While most areas received 1 to 3 inches of rain from Helene, more very heavy rainfall was reported in Berkeley County. A weather spotter reported over 6 inches of rain between midnight and midday on the 22nd, northeast of Pinopolis, on the south shore of Lake Moultrie. Severe flooding occurred in the county, mainly in the Moncks Corner area. Several homes and businesses were flooded. Unfortunately, a woman was killed when her car hydroplaned on a roadway in Pinopolis and struck a tree. Two flood warnings were issued for Berkeley County, one for the afternoon of the 22nd, then again during the early morning hours on the 23rd.

From July to September, about 60 percent of the year's rainfall occurred in Charleston, a total of 24.16 inches, while about 45 percent of this year's rainfall fell in that timeframe in Savannah, a total of 15.20 inches. The heavy rains from these storms put a big dent in the yearly rainfall deficit, at least across the Charleston and Berkeley County areas. The yearly deficit, which began at 7.79 inches at the end of June, dropped to "only" 2.42 by the end of September in Charleston. However, there is still a significant rainfall deficit in Savannah, at 8.63 inches below the yearly normal through the end of September.

For more information about the drought, as well as precipitation and index maps updated weekly, check out the NOAA Drought Information Center's web page at: http://www.drought.noaa.gov/

Technology update at the Charleston WFO...

The latest addition to our high-tech Weather Forecast Office (WFO) comes in the form of the Interactive Computer Worded Forecast (ICWF)!

The ICWF was developed by the Meteorological Development Laboratory to help NWS forecasters move into modernized operations. At the heart of the ICWF lies a digital database which contains forecasts of weather elements (i.e. maximum and minimum

temperature, wind speed and direction, and amount of cloud cover).

Forecasters use ICWF tools to edit the values in the database and then use product generation tools to automatically compose and format their products. This allows NWS forecasters to concentrate on making important forecast and warning decisions, rather than on preparing products. Tedious jobs such as typing, proofreading and writing can now be done automatically.

As the NWS modernization progresses, new emphasis is being placed on the warning and forecasting of destructive storms at themesoscale level (such as a sea-breeze front) of meteorology. These mesoscale events require considerable attention and updating, especially during busy weather days. ICWF can be a valuable resource in generating routine products that share similar meteorological information.

What this means to our daily operations, is more forecaster time to analyze the weather and keep on top of critical events such as severe weather and flooding. In addition to our routine forecast products, ICWF will allow us to automatically compose graphical products, based on the forecast parameters in the digital database. Eventually, practically all of our regular products will be available in a graphical presentation, and available on the internet. And what this means to our customers is an even better National Weather *Service!*

Waterspouts Along the Coast...

By Eleanor-Vallier Talbot, Senior Forecaster

During late July and early August, several sightings of waterspouts occurred along the South Carolina coast. Two of these spouts moved onshore, becoming weak tornadoes.

On July 23, 2 waterspouts formed. In Georgetown county, near Litchfield Beach, a large waterspout was spotted by the public and SKYWARN weather spotters. The NWS in Wilmington issued a tornado warning at 8:24 p.m. Video seen later indicated that this was a tornadic type waterspout associated with a strong thunderstorm. There were no known reports of this waterspout moving onshore. Later that evening, a waterspout came ashore along the Isle of Palms in Charleston County, near the Wild Dunes residential district. Reports came in of minor damage to oceanfront property; one house had to be evacuated. The NWS in Charleston issued a tornado warning for this spout at 9:22 p.m. The waterspout dissipated quickly after moving inland.

One week later, on July 30, another waterspout was sighted about 6 miles south of Kiawah Island. The Charleston NWS office issued a tornado warning for south central Charleston County at 7:38 p.m., followed by a special marine warning at 7:44 p.m. Again, there were no known reports of this spout moving onshore. Video showed this waterspout to be the "general" weak type. However, even in a weak waterspout, winds can reach up to hurricane force. Finally, on the afternoon of August 3, another waterspout formed off of the Isle of Palms and moved ashore, again near the Wild Dunes resort. A special marine warning was issued at 2:31 p.m. by NWS Charleston. Video seen on The Weather Channel showed that the spout was tending to dissipate as it moved across the beach. However, debris was thrown all over, including many chairs and beach towels.

Most of these waterspouts were not detected by radar, but these storms do not have to be very strong to produce waterspouts; as a matter of fact, waterspouts can develop from towering cumulus clouds (TCU). Ingredients needed for waterspout development are very warm ocean (or even lake) waters and some rising air. Water temperatures during these waterspout episodes were in the mid 80s, with a weak stationary front draped across the area on two of the occasions.

Waterspouts usually develop from the ocean surface upward, with cloud tops only about 18,000 to 22,000 feet high. Waterspouts are most common along the southern coast of Florida and in the Florida Keys, but they have been reported along the entire Gulf of Mexico coast, with some even off the southern California coast, and along the Atlantic coast up to the Chesapeake Bay. Rarely, waterspouts have even formed as far north as the southern New England coast, as well as on some larger lakes, such as the Great Lakes. On July 3, 1986, a tornado formed on the western shore of Narragansett Bay, Rhode Island, and moved over the Bay to become a waterspout.

For more information about how waterspouts form, and the life cycle of a waterspout, check out an excellent web page produced by the NWS in Morehead City, NC. The web address is: http://www.nws.noaa.gov/mhx/wtrsptst.htm

The Complex Convective Severe Weather Outbreak of June 22, 2000...

By James Brotherton, Meteorologist Intern

This event is fresh in the minds of lowcountry residents in the Allendale and Hampton areas, where severe weather blossomed late in the afternoon. This severe weather outbreak was associated with an "active" (the low-level flow was parallel to the surface front) cold front that was part of a larger system, consisting of a synoptic-scale cyclone near the Canadian border. When the cold front finally made its way into the lowcountry, the air was already very humid, and the atmospheric dynamics that were occurring in the upper levels of the atmosphere triggered the severe weather. During the event, the entire area was under a severe thunderstorm watch from the Storm Prediction Center (SPC) in Norman, OK.

While there was generally a large area of activity, the most severe thunderstorms were in the Hampton County area. The severe storms interacted on a complex level, and on a small, localized scale.

By studying the base and interpreted images from the Weather Service Doppler Radar (WSR-88D) in Charleston (CLX), it can be seen that many of the individual cells merged and the cellular outflow boundaries collided. Throughout this severe weather event, it can also be seen that outflow from one cell or cell structure can steer another cell structure. Also, bow-echo signatures could be seen several times on the interpreted images from the WSR-88D.

During the event, several severe thunderstorm warnings were issued by the National Weather Service in Charleston. In Hampton County, there were several reports of wind damage, and one F1 tornado touched down in the town of Hampton.

To see the complete study of this localized severe weather event, please check out our new **"Local Studies"** page on our website. This new page also includes several other studies that have been done on a local level, by the staff of the Charleston Weather Forecast Office (WFO). The address is: http://www.erh.noaa.gov/chs/research.htm

Spotter News...

Here is a list of the spotters from whom we received reports over the past year (May-September). Thanks goes out to all of our spotters. Also, the media, law enforcement, emergency management and others who relayed these valuable reports. A special thanks to those who attended the spotter training sessions held this past year. Your services to the NWS and the community are greatly appreciated!

ALN004 - William English ALN013 - Reynold Simmons

BOC001 - T. Bishop BOC013 - Charles Roberts

BOC015 - Charles Rushing

BRK118 - Cyrus&Shelia Frank (3)

BRK140 - Wyatt&Ann Propst

BRK153 - Stewart Powell (4)

BRK175 - Scott Luedtke

BRK257 - Jacqueline Pinckney

BRK260 - Keith Gourdin (2)

BRY029 - Cheryl Waters BRY030 - E. Waters BRY041 - Curtis Griffin BUF181 - Steve Kerchner

CAN013 - Kathyrn Smith CAN015 - Shelia Sutton CHA013 - Ralph Quinn, Jr. CHA065 - Chris Slayton

CHS333 - Anne Ball COL118 - John Graham (2)

COL123 - Robert Spires

COL146 - Kevin Wicker

COL162 - Kramara Brown

DOR120 - Nathan Tart

DOR123 - Jeff Clarke

DOR124 - Michael Blanton

DOR163 - Kim Nauman

DOR165 - James Roberts

DOR168 - Linda Treveiler

DOR218 - Faye Kropp

DOR219 - Richard Boyd, Jr. (3)

HAM102 - Lynn Sanders

HAM109 - J.W. Bennet, Jr.

HAM132 - Charles Boles (2)

HAM134 - Don Mixson

JAS110 - Charles Malphrus

JAS111 - Rodney Malphrus

JAS122 - Handy Dan's Exxon

LON001 - Charles Lavalley

LON020 - Brian Bray

SCR009 - Wanda Scott-Bragg

Severe Weather Reports to the NWS...

1. Call Us!!!

2. What did you observe?

Tornado/Funnel Cloud? Damaging wind?

Hail? Significant rain/snow/ice?

Other pertinent info?

3.When did you observe it?

4. Where did you observe it (Direction and distance from a known location)?

5.Where is it headed?

6. Other useful info...What is happening (damage/destruction)?

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